

DESCRIPTION

Analog Devices Power Supplies are designed to provide OEMs and circuit designers with a broad line of high reliability, regulated and short circuit protected power supplies at low overall cost. These modules are available with 5 volt to 24 volt output (single and dual), and current ratings from 25mA to 1 amp. Most Analog Devices Power Supplies are available from stock in both large and small quantities. Substantial discounts apply on quantity orders, prices start at \$23.

ADVANTAGES

Packaged circuit modules have found wide acceptance. Engineers have discovered the convenience and economy of plug-in building blocks ... op amps, logic cards, miniature A/D and D/A converters are now available in wide varieties. Now a complete line of modular power supplies is available from Analog Devices. Most of these units are packaged in the popular encapsulated case. They are shipped ready to use, at prices below the internal manufacturing cost of most OEM units. Further savings and reduced lead time are achieved by eliminating engineering start-up, documentation costs, and manufacturing overhead. Designed by experts in op amp and digital logic technology, these units offer features that you would expect to find only in considerably more expensive supplies.

ENCAPSULATED MODULES (900 SERIES)

A line of modular power supplies covers most popular applications and for high current loads. These supplies all feature line and load regulation and are short circuit protected. Mating sockets are available, or the unit may be mounted on and soldered directly to a printed circuit card. Voltage ranges include 5VDC to ± 24 VDC. Current ranges extend from 25mA up to 1 amp.

METAL CASED MODULES (900 SERIES)

The ± 15 VDC, 300mA, 500mA and 1 amp cased power supplies are designed with the system designer's needs in mind. These units provide the power needed to run large Modularized, Transistorized and Integrated Circuit systems. The 300 and 500mA supplies come in 3.5 inch cube cases with an 11 pin connector (supplied). The ± 15 volt, 1 amp unit is mounted in a finned case and has barrier terminal strip connectors. All of these units provide for remote sensing.

EXTRA-HIGH ACCURACY SUPPLIES (MPD SERIES)

Analog Devices "MPD" line of Power Supplies are intended for applications where the ultimate in performance is required. They feature excellent regulation and low temperature coefficients. Typical applications include providing stable references for computing, instrument, and data reduction circuitry. All MPD supplies are sealed in anodized aluminum enclosures for maximum ruggedness and minimum RFI. Being essentially DC to DC converters, these units feature low "see through" capacitance (typically 20pF) and are desirable for powering floated circuits and use in systems having considerable ground noise.

OPTIONS

Most supplies are available with 205-240VAC, 50-400Hz input at no additional charge. Specify option "E" when ordering. Models 904 and 909 are available with a transformer shield which reduces input to output see-through capacity to 10pF max. Specify option "I" when ordering and add \$8 each to unit prices. Model 906 (5VDC/250mA) available with 6.0VDC overvoltage protection at \$8 each additional. All other 5VDC logic supplies (Models 903 and 905) include overvoltage protection at no additional charge.

900 SERIES, MPD SERIES

MODULAR POWER SUPPLIES FOR OP AMPS & LOGIC CIRCUITRY

FEATURES

Low Cost, from \$23 (1-9)

Short Circuit Protected

Line & Load Regulated

Small Size

5VDC to ± 24 VDC

25mA to 1000mA

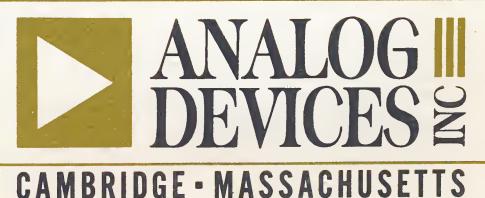
Temperature Compensated



Encapsulated "P" Case



Cube "C" and Finned Case



221 FIFTH ST., CAMBRIDGE, MASS. 02142

TEL: 617/492-6000 TWX: 710/320-0326



CAMBRIDGE - MASSACHUSETTS

900 SERIES MODULAR POWER SUPPLY

SPECIFICATIONS			± 12 VOLTS			± 15 VOLTS				
MODEL	907	909	908	915	904	902	916	917	918	931
E out (V)	± 12	± 12	± 12	± 15	± 15	± 15	± 15	± 15	± 15	± 18
I out (mA) (min full load)	± 25	± 50	± 100	± 25	± 50	± 100	± 300	± 500	± 1000	± 25
PRICE (1-9)	\$23.	\$49.	\$59.	\$23.	\$39.	\$49.	\$98.	\$114.	\$148.	\$23.
PRICE (10-24)	\$22.	\$47.	\$56.	\$22.	\$38.	\$47.	\$93.	\$108.	\$141.	\$22.
CASE	P	P	P	P	P	P	C	C	Fin	P
LINE REG. (MAX) (105-125 VAC)	0.2%	0.01%	0.01%	0.2%	0.1%	0.05%	0.05%	0.05%	0.05%	0.2%
LOAD REG. (MAX) (0-100%)	0.2%	0.05%	0.05%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%
TEMP COEF. ($^{\circ}$ C)	0.02%	0.015%	0.015%	0.02%	0.015%	0.015%	0.02%	0.02%	0.02%	0.02%
WARM UP DRIFT	30mV	15mV	15mV	30mV	37mV*	45mV*	25mV*	25mV*	25mV*	30mV
OPERATING TEMP RANGE ($^{\circ}$ C)	-25 to +71	-25 to +71	-25 to +71	-25 to +71	0 to +71 ¹	0 to +71 ¹	-25 to +71	-25 to +71	-25 to +71	-25 to +71
STORAGE TEMP RANGE ($^{\circ}$ C)	-25 to +85	-25 to +85	-25 to +85	-25 to +85	-25 to +85	-25 to +85				
OPTIONS	E	E	E	E,I,D	E,I,D	E,I,D	E,I,D	E,I,D	E,I,D	E
RIPPLE & NOISE (MAX)	1mV rms	1mV rms	1mV rms	1mV rms	0.5mV rms	0.5mV rms	1mV rms	1mV rms	1mV rms	1mV
INPUT ISOLATION	50M Ω	50M Ω	50M Ω	50M Ω	500M Ω	50M Ω	50M Ω	50M Ω	50M Ω	50M Ω
OUTPUT IMPEDANCE (@ 90% I_L $\pm 10\%$ I_L Swing)	0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.2Ω @ 10kHz				
OUTPUT VOLTAGE ERROR (MAX)	$\pm 1\%$	$\pm 1\%$	$\pm 1\%$	$\pm 1\%$	+200mV ⁶ -0mV	+300mV ⁶ -0mV	$\pm 1\%$	$\pm 1\%$	$\pm 1\%$	$\pm 1\%$
WEIGHT	12 oz.	1 lb.	1 lb.	2 lbs.	5 lbs.	12 oz.				
MATING SOCKET	AC1013	AC1013	AC1013	AC1013	AC1013	AC1013	see dwg.	see dwg.	see dwg.	AC1013

Specifications subject to change without notice (Typical @ $+25^{\circ}$ C and 115VAC unless otherwise noted)

OPTIONS AVAILABLE

- "E" Option— 205-240VAC, 50-400Hz input. No additional charge.
- "I" Option— Units have transformer interwinding shield with separate ground lead. Maximum input to output see-through capacitance with this option is 10pF. \$8 additional per unit.
- "D" Option— Overvoltage protection available at \$8/unit additional charge. Nominally at 1 volt above rated output.

GENERAL INFORMATION

1. All supplies have 105-125VAC, 50-400Hz input unless Option "E" is ordered.
2. All Cube "C" case modules shipped with mating 11 pin Amphenol connector at no additional charge.
3. MPD series supplies housed in Aluminum cases for maximum RFI suppression.
4. All supplies are short circuit protected except MPD series

supplies are not short protected between different outputs.

MPD5-150A short protected only on 5VDC output.

5. Model 905 is in an Aluminum case, dimensions identical to the "P" case.

FOOTNOTES

*Indicates "maximum" specification.

¹ Derate 5mA/ $^{\circ}$ C above $+55^{\circ}$ C, derate 1mA/ $^{\circ}$ C below $+10^{\circ}$ C. Available on special order with full -25°C to $+71^{\circ}$ C operating temperature range without derating.

² Derate 12mA/ $^{\circ}$ C above $+50^{\circ}$ C, derate 10mA/ $^{\circ}$ C below $+15^{\circ}$ C. Available on special order with full -25°C to $+71^{\circ}$ C operating temperature range without derating.

³ Derate 7mA/ $^{\circ}$ C for temperature $> 55^{\circ}$ C.

⁴ Overvoltage protection at 6.5VDC included.

⁵ May be used as either -5V or +5V supply.

⁶ Outputs track within 3% (Model 904) or 1% (Model 902).

5V to ±24V FOR ALL OP AMP AND LOGIC REQUIREMENTS

±18 VOLTS		±24 VOLTS		5VDC LOGIC SUPPLIES			MPD SERIES POWER SUPPLIES (High Stability)				
935	932	933	934	906	903	905	MPD 15/100A	MPD 15/300A	MPD 5-150A	MPD 5/750A	
±18	±18	±24	±24	5 ^s	5 ^s	5 ^s	±15	±15	5VDC	5	
±50	±100	±50	±100	250	500	1000	±100	±300	600mA(5V)	750	
\$55.	\$65.	\$55.	\$65.	\$39.	\$49.	\$69.	\$149.	\$275.	5mA(150V)		
\$52.	\$62.	\$52.	\$62.	\$38.	\$47.	\$66.	\$141.	\$260.	\$141.	\$149.	\$149.
P	P	P	P	P	P	P	see dwg.	see dwg.	see dwg.	see dwg.	
0.01%	0.01%	0.01%	0.01%	0.05%	0.15%	0.05%	0.005%	0.005%	0.005%	0.005%	0.005%
0.05%	0.05%	0.05%	0.05%	0.1%	0.3%	0.1%	0.02%	0.02%	12.5mV	12.5mV	
0.015%	0.015%	0.015%	0.015%	0.02%	0.02%	0.02%	0.015%*	0.015%*	0.05%*	0.05%*	
15mV	15mV	15mV	15mV	25mV	15mV	40mV	—	—	—	—	
-25 to +71	-25 to +71	-25 to +71	-25 to +71	0 to +71 ²	-25 to +71	-55 to +71	-55 to +71 ³	-55 to +71	-55 to +71	-55 to +71	
-25 to +85	-25 to +85	-55 to +125	-55 to +125	-55 to +125	-55 to +125	-55 to +125					
E	E	E	E	E, D	E ⁴	E ⁴	—	—	—	—	
ns	1mV rms	1mV rms	1mV rms	1mV rms	1mV rms	1mV rms	0.5mVp-p	0.5mVp-p	6mVp-p	6mVp-p	
	50MΩ	50MΩ	50MΩ	50MΩ	500MΩ	25MΩ	10MΩ	10MΩ	10MΩ	10MΩ	
0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.2Ω @ 10kHz	0.05Ω @ 10kHz	0.05Ω @ 10kHz	0.05Ω @ 10kHz	—	—	—	—	
±1%	±1%	±1%	±1%	±1%	±1%	±1%	Adj.	Adj.	Adj.	Adj.	
12 oz.	18 oz.	12 oz.	18 oz.	12 oz.	17 oz.	18 oz.	7 oz.	22 oz.	7 oz.	7 oz.	
AC1013	AC1013	AC1013	AC1013	AC1013	AC1013	AC1013	see dwg.	see dwg.	see dwg.	see dwg.	

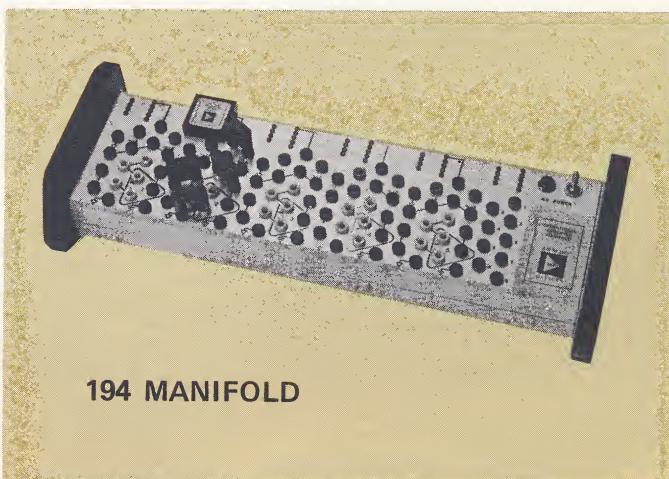
MODEL 950 POWER SUPPLY MANIFOLD

This manifold permits use of the 900 series "P" cased modules on the design bench. In combination with these supplies the 950 provides a safe, convenient, and inexpensive bench supply for breadboarding, testing, or general laboratory use. Cost is just \$16 (1-9), and \$15 (10-24).

MODEL 194 OPERATIONAL AMPLIFIER MANIFOLD

The Model 194 manifold is ideal for experimenting, breadboarding, and/or teaching with op amps. Completely self-contained, it includes a ±15VDC 100mA power supply, and accepts up to 5 amplifiers in the popular 7 pin "Q" case configuration, in sizes up to 1.5 in. square. Adapters are available for integrated circuits such as the Analog Devices AD741K or AD502 IC Op Amps. Provisions are made for a balance potentiometer for each amplifier. The unit

is designed for maximum flexibility, with all connection points $\frac{1}{4}$ in. apart. Price is \$250 each (1-9), substantially less in higher quantity.



X MONITOR DISPLAYS

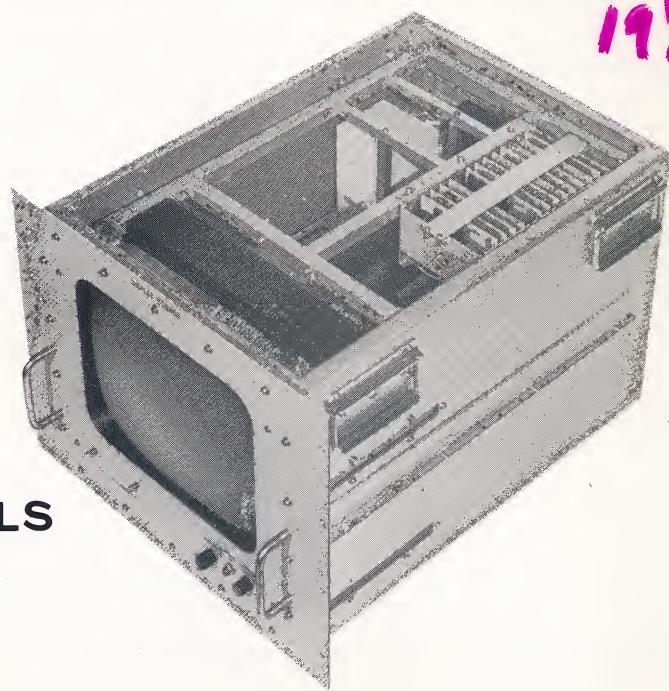
an AYDIN company



Data Sheet
8012

1970

MODEL 8012 RUGGEDIZED CRT DISPLAY FOR COMPUTER GRAPHIC TERMINALS



The MONITOR Model 8012 CRT Display is a direct-writing, alphanumeric/graphic computer output display. Characters, dots, vectors, circles, arcs or conics may be displayed. Gamma correction and delay time cancellation are provided so that special circuitry is not required in the appropriate generators. The tube life is guaranteed for 1,000 hours at the working character. MONITOR meets the military.

DESIGN FEATURES

- Single Magnetic Coil Deflection
- Phosphor Protection
- All Silicon Solid State Circuitry
- Pincushion Correction
- Large Display Area (8" x 10")
- Low Power Consumption
- Zero Differential Delay Interface for Faithful Reproduction of Characters, Vectors, and Conics.
- Rack Mounting
- Ruggedized Unit
- Gamma Correction

SPECIFICATIONS

Cathode Ray Tube

15" with P31 phosphor and shielded bonded faceplate

Display Linearization

8" x 10"

±1%

Pincushioning

±2%

Light Output

50 foot-lamberts

Writing Speed

50,000 inches/second

Line Width

0.020"

Z-Axis

Input Sensitivity

+3V for full intensity

Input Impedance

75-ohm termination is standard

Rise Time
Gamma Correction

50 nsec
Light output is linear with respect to input voltage

Delay Time

Zero differential delay of the z-axis with respect to the X and Y signal

Major Deflection

Input Sensitivity

5V for full scale deflection

Input Impedance

75-ohm termination is standard

Large Signal Response

15 kHz

Small Signal Response

500 kHz @ -3db

X-Y Phase Shift

Less than 1 line separation @ 10 kHz

Settling Time

50 Microseconds to 0.25% for full screen deflection

3 Microseconds to 0.25% for 0.5"

deflection

Minor Deflection

Input Sensitivity	5V p-p for 0.5 inch deflection
Input Impedance	75-ohm termination is standard.
Frequency Response	1 MHz @-3db
X-Y Differential	
Phase Shift	Less than 1 line separation @ 1 MHz

Inputs: (BNC Connectors, rear)

1. Z-input Major Deflection
2. X-input Minor Deflection
3. Y-input Major Deflection
4. Y-input Minor Deflection
5. Z-input

Operator Controls: (Front)

On/Off
Focus
Intensity

Power Requirements	200V $\pm 10\%$ 3 phase 400 Hz / $\pm 5\%$, 300 watts
Environment	0°C - 50°C operating temperature.

Size, basic chassis.	14-1/2"W x 12-7/8"H x 25"D
Weight	70 lbs.
Size with Front Panel & Mask	19"W x 14"H x 25"D
Weight	75 lbs.
Size with Front Panel & Mask and Case	19"W x 15-3/4"H x 25"D
Weight	95 lbs.
Available Options	8012P CRT with position generator 8012-CP CRT with position generator and character deflection generator

OPTION P, POSITION GENERATOR FOR 8012 CRT**Functional Description**

The input signal lines accept positioning address information and strobe it into two digital to analog converters which produce the x and y positioning voltages. These positioning

8012 4-70 10M

voltages are applied to the CRT deflection amplifiers. The position generator will display 512 addressable positions; 32 (x) positions and 16 (y) positions.

Specifications

Inputs:	Compatible with TTL logic levels (positive logic) x position - 5 bit parallel word y position - 4 bit parallel word position strobe pulse (negative transition)
Settling Time	2 microseconds
Accuracy	$\pm 0.5\%$ of full scale

OPTION C, CHARACTER DEFLECTION GENERATOR FOR A 8012 CRT WITH OPTION P.**Functional Description**

Input signal lines accept character stroke information and strobe it into storage registers. Each stroke of a character can be composed of the following:

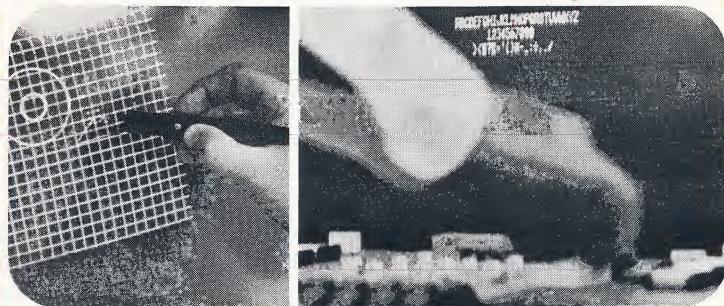
x, 2x, sign (x), y, 2y, sign (y), z', z''

The output of the storage registers are converted to analog voltages by function generators. These voltage levels are summed and integrated by output drivers. The length of an x or y stroke is 1/16". The intensity levels are decoded and presented to the cathode of the CRT as intensity modulation voltages. One of four intensity levels (including blank) can be specified for each stroke of the character. The outputs of the character deflection drivers are summed with the positioning voltages in the CRT deflection amplifiers for the display of text information.

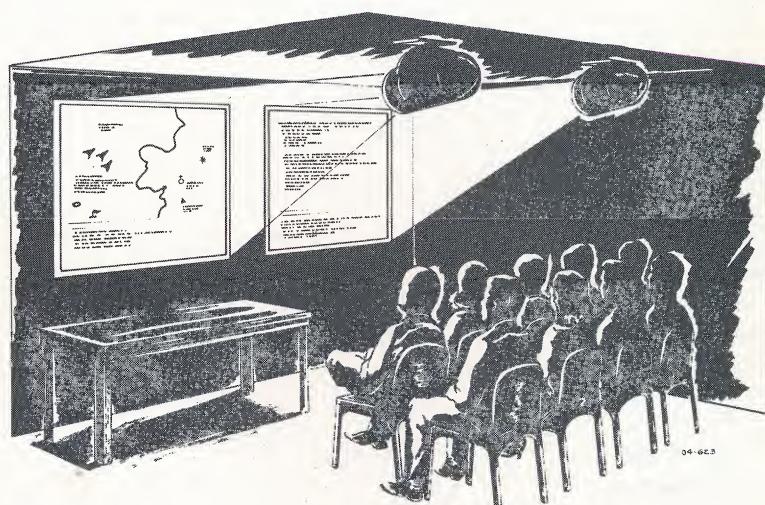
Specifications

Inputs	Compatible with TTL logic levels (positive logic) 8 bit parallel character stroke format
	x, 2x, sign (x) y, 2y, sign (y) z', z'' character strobe pulse (negative transition)
Speed	500 kHz stroke writing rate

Monitor Displays reserves the right to change specifications without notice.



1970

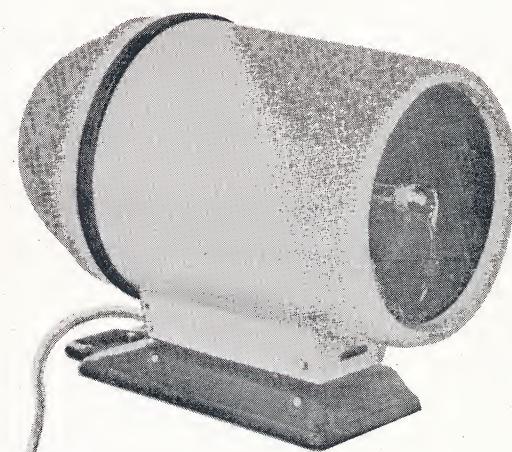


MODEL 8060 PROJECTION DISPLAY FOR COMPUTER GRAPHIC TERMINALS SYSTEMS

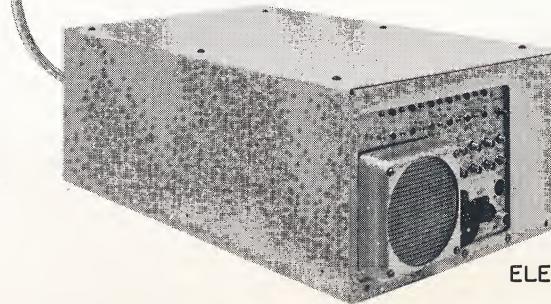
The MONITOR Model 8060 Projection Display is a direct-writing, alphanumeric/graphic computer output display. Characters, dots, vectors, or conics may be displayed. Gamma correction and delay time cancellation are provided so that special circuits are not required in the appropriate generators. The tube is protected from phosphor burns as a result of failure in the deflection circuitry or absence of input signal. Up to 1000 characters may be displayed at a refresh rate of 60 Hz; the writing rate for vectors and graphics is 1,000,000 inches/second. A complete line of character, vector, circle, and arc generators is available from MONITOR to work with this unit. Projection is accomplished thru a Schmidt optical system. The projection head is separate from the display electronics thus allowing optimum positioning of the projection head.

DESIGN FEATURES

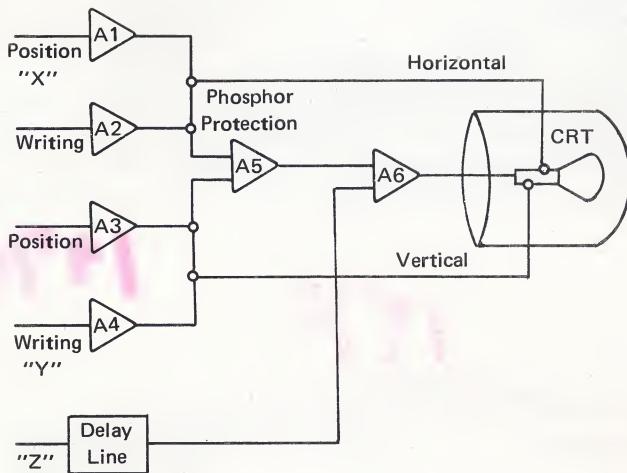
- Single Magnetic Coil Deflection
- All Silicon Solid State Circuitry
- Large Display Area (48" x 48")
- Zero differential delay interface for faithful reproduction of characters, vectors, and conics.
- Gamma Correction
- Phosphor Protection
- Low Power Consumption
- Separate Projection Head



PROJECTION HEAD



ELECTRONICS UNIT



A1 through A4 are wideband amplifiers used for positioning and writing. All amplifiers are DC coupled and have 75-ohm inputs. Self-contained adjustments are available to set up each channel. A5 is the phosphor protection amplifier whose output inhibits the z-axis amplifier, A6, should there be no deflection signal at the outputs of A1-A4. A6 is the z-axis amplifier with gamma correction which is DC coupled and accepts an analog signal. A delay line is added in series with the input to match the delay of the x and y amplifiers.

SPECIFICATIONS

Projection Head

Size and type	14" Schmidt Optics
Throw Distance	13' - 18'
Display Area	48" X 48"
Linearity	±1%
Light Output	5 foot-lamberts at 13 feet
Writing Speed	1,000,000 inches/second
Line Width	0.100"

Z-Axis

Input Sensitivity	+3v for full intensity
Input Impedance	75-ohm termination is standard.
Rise Time	50 nsec.
Gamma Correction	Light output is linear with respect to input voltage.
Delay Time	Zero differential delay of the z-axis with respect to the X and Y signals.

Major Deflection

Input Sensitivity	5 vpp for 48" deflection
Input Impedance	75-ohm termination is standard
Large Signal Response	20 KHz
Small Signal Response	500 KHz @ -3db
X-Y Phase Shift	Less than 1 line separation at 15 KHz
Settling Time	25 microseconds for full screen deflection to settle to within 0.25%. 3 microseconds for 1.0 inch to settle to within 0.25%.

Minor Deflection

Input Sensitivity	5vpp for 2 inch deflection
Input Impedance	75 ohm (termination)

Frequency Response

1 MHz @ 3db

X-Y Differential Phase Shift

Less than 1 line separation @ 1 MHz

Inputs (BNC Connectors, rear)

1. X-Input Major Deflection
2. X-Input Minor Deflection
3. Y-Input Major Deflection
4. Y-Input Minor Deflection
5. Z-Input

Operator Controls

- On/Off
- Focus
- Intensity

Service Adjustments: (Rear)

- X-Input deflection sensitivity
- X-Input D.C. level
- Y-Input deflection sensitivity
- Y-Input D.C. level
- Z-Input D.C. level

Power Requirements 115V ±10% 60 Hz, 300 watts

Environment 50°F to 100°F

Size Electronics Unit 9"H x 14½"W x 28½"D

Projection Head 20"H x 16"W x 30"D

Weight Electronics Unit — 75 pounds

Projection Head — 35 pounds

Other Options

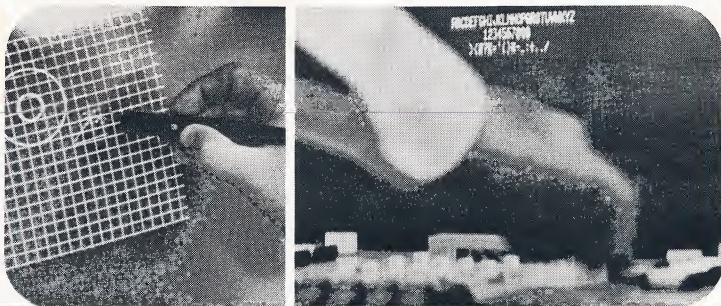
- Higher performance
- Custom configuration
- Daisy chain operation
- Ruggedized units
- MIL or NASA Specifications

Monitor Displays reserves the right to change specifications without notice.

MONITOR DISPLAYS
an AYDIN company

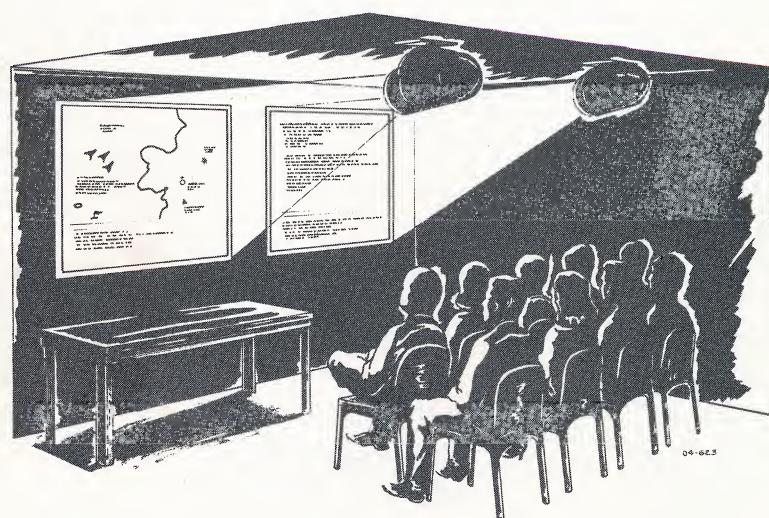
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PHONE NUMBER: 215-646-8100 • TWX: 510-661-1520



Data Sheet
8060

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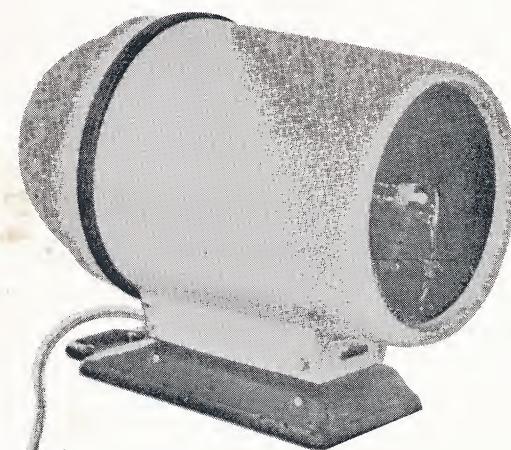


MODEL 8060 PROJECTION DISPLAY FOR COMPUTER GRAPHIC TERMINALS SYSTEMS

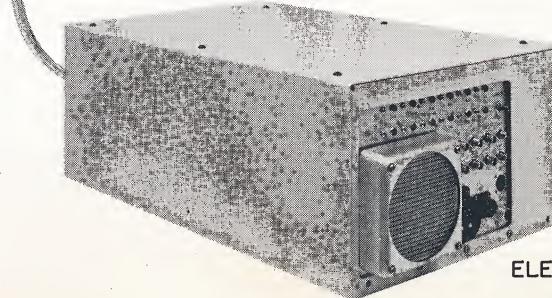
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DESIGN FEATURES

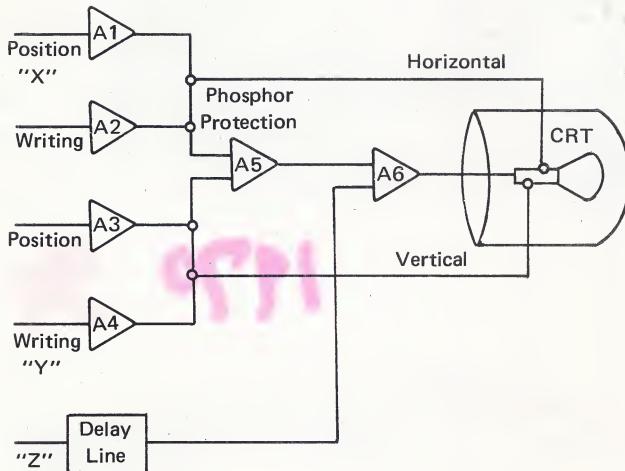
- Single Magnetic Coil Deflection
- All Silicon Solid State Circuitry
- Large Display Area (48" x 48")
- Zero differential delay interface for faithful reproduction of characters, vectors, and conics.
- Gamma Correction
- Phosphor Protection
- Low Power Consumption
- Separate Projection Head



PROJECTION
HEAD



ELECTRONICS
UNIT



A1 through A4 are wideband amplifiers used for positioning and writing. All amplifiers are DC coupled and have 75-ohm inputs. Self-contained adjustments are available to set up each channel. A5 is the phosphor protection amplifier whose output inhibits the z-axis amplifier, A6, should there be no deflecting signal at the outputs of A1-A4. A6 is the z-axis amplifier with gamma correction which is DC coupled and accepts an analog signal. A delay line is added in series with the input to match the delay of the x and y amplifiers.

SPECIFICATIONS

Projection Head

Size and type	14" Schmidt Optics
Throw Distance	13' - 18'
Display Area	48" X 48"
Linearity	$\pm 1\%$
Light Output	5 foot-lamberts at 13 feet
Writing Speed	1,000,000 inches/second
Line Width	0.100"

Z-Axis

Input Sensitivity	+3v for full intensity
Input Impedance	75-ohm termination is standard.
Rise Time	50 nsec.
Gamma Correction	Light output is linear with respect to input voltage.
Delay Time	Zero differential delay of the z-axis with respect to the X and Y signals.

Major Deflection

Input Sensitivity	5 vpp for 48" deflection
Input Impedance	75-ohm termination is standard
Large Signal Response	20 KHz
Small Signal Response	500 KHz @ -3db
X-Y Phase Shift	Less than 1 line separation at 15 KHz
Settling Time	25 microseconds for full screen deflection to settle to within 0.25%, 3 microseconds for 1.0 inch to settle to within 0.25%.

Minor Deflection

Input Sensitivity	5vpp for 2 inch deflection
Input Impedance	75 ohm (termination)

Frequency Response

1 M

X-Y Differential Phase Shift

Le

separation = 1 MHz

Inputs (BNC Connectors, rear)

1. X-Input Major Deflection
2. X-Input Minor Deflection
3. Y-Input Major Deflection
4. Y-Input Minor Deflection
5. Z-Input

Operator Controls

- On/Off
- Focus
- Intensity

Service Adjustments: (Rear)

- X-Input deflection sensitivity
- X-Input D.C. level
- Y-Input deflection sensitivity
- Y-Input D.C. level
- Z-Input D.C. level

Power Requirements 115V $\pm 10\%$ 60 Hz, 300 watts

Environment 50°F to 100°F

Size Electronics Unit 9"H x 14 1/2"W x 28 1/2"D

Projection Head 20"H x 16"W x 30"D

Weight Electronics Unit - 75 pounds

Projection Head - 35 pounds

Other Options

- Higher performance
- Custom configuration
- Daisy chain operation
- Ruggedized units
- MIL or NASA Specifications

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MONITOR DISPLAYS
an AYDIN company

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